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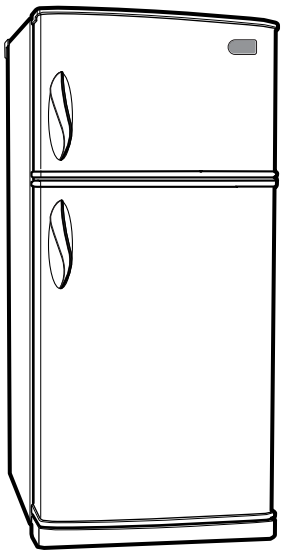
REFRIGERATOR

SERVICE MANUAL

CAUTION
BEFORE SERVICING THE UNIT, READ THE "SAFETY PRECAUTIONS" IN THIS MANUAL.



MODEL: GR-S552 / GR-S592

CONTENTS

SAFETY PRECAUTIONS

Please read the followings before servicing your refrigerator.

1. Check if an electric leakage occurs in the set.
2. To prevent electric shock, unplug prior to servicing.
3. In case of testing with power on, wear rubber gloves to prevent electric shock.
4. If you use any appliances, check regular current, voltage and capacity.
5. Don't touch metal products in cold freezer with wet hand. It may cause frostbite.
6. Prevent water flowing to electric elements in mechanical parts.
7. When you stand up during observing the lower part with the upper door open, move with care to prevent head wound which may happen by hitting the upper door.
8. When sloping the set, remove any materials on the set, especially thin plate type. (ex.: glass shelf or books.)
9. When servicing evaporator part, wear cotton gloves without fail. It is to prevent wound by sharp fin of evaporator.
10. Leave a breakage of refrigerating cycle to a heavy service center. The gas in cycle inside may soil ambient air.

SERVICING PRECAUTIONS

Air Recharging in Compressor

Test the refrigeration by connecting it electrically before refilling operation. It is necessary to ascertain the function of the motor-compressor and identify the defects immediately. If the defects have been found, empty the old system of eventual R-134a residue by breaking off the end of the extension piece at its narrow point. (Figure 1)

Replace the filter and any damaged components. Unsolder and pull off the piece remaining inside the service tube and then attach an extension completely with male Hansen and last, solder it to the same tube again. (Figure 2)

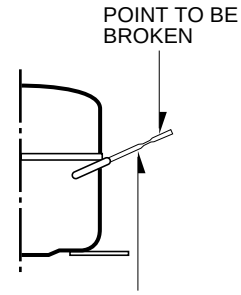


Figure 1

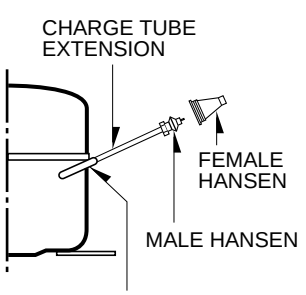


Figure 2

It is necessary to execute the soldering operation with valve open so that the fumes caused by oil residue can come out freely without blowholes between two tubes during heating the point to be soldered.

The extension fitted with the male Hansen is connected to the female fitting of the vacuum pump tube. (Figure 3)

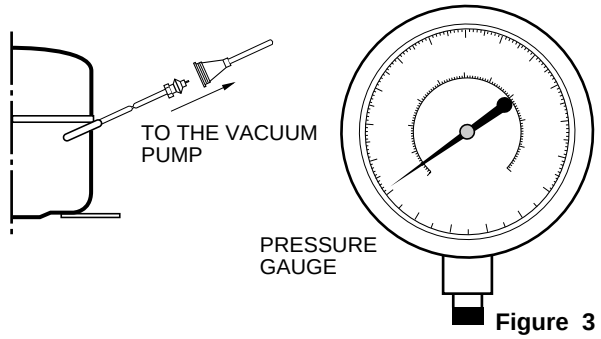


Figure 3

Air evacuating from the system begins so soon as the pump starts. The refrigeration system must be kept under vacuum until the reading on the low-pressure gauge indicates vacuum (0 absolute, -1 atm., -760 mm hg) in any case it is advisable to keep the pump running for about 60 minutes. (Figure 3)

In case that a considerable leakage occurs and to stop the vacuum pump will be necessary and add a small quantity of Freon to the system, if vacuum should not be obtained (pressure gauge can't fall to 1 atmosphere), start the refrigeration unit and find the leakage with the special leak-finder. When the defective soldering point is visible, re-do it after opening the extension tube valve and reestablishing the normal outside pressure inside the group.

Because the melted alloy is sucked into the tubes and block them, the pressure must be rebalanced when vacuum is in the system in soldering. As soon as the vacuum operation is over, add the quantity in grams of R-134a to the refrigerant system. Remember that every system has an exact quantity of R-134a with a tolerance of ±5 grams that can be added. (Figure 4)

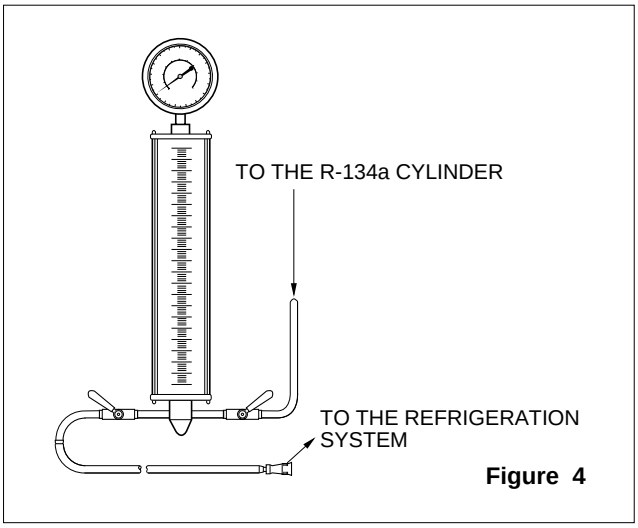


Figure 4

Before performing this operation (if the vacuum pump and refilling cylinder are connected), make sure that the valve placed between the vacuum pump and refilling tube are closed to keep the Freon for adding to the system. (Figure 5)

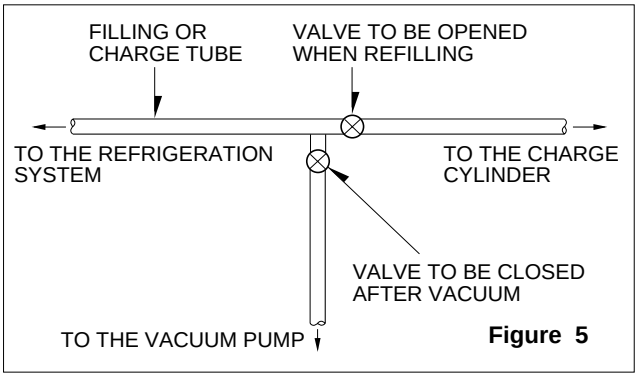


Figure 5

In addition, check the graduated scale on the cylinder for the quantity of R-134a to be added, for example, if we have 750 grams of Freon in the cylinder and must add 165 grams to the group, this amount will be reached when R-134a has dropped to 585 grams, remembering that the indicator shows a lower limit of meniscus. Do this after choosing the scale corresponding to the gas pressure different scales reported as the same gas pressure indicated by the pressure gauge on the top of the column.

To make R-134a flow into the system, open the valve placed at the base of the cylinder and connected to the filling tube. The amount of Freon cannot be added to the system all at once because it may cause a blocking of motor-compressor. Therefore, proceed by adding original quantity of about 20-30 grams and close the valve immediately.

The pressure rises and the motor-compressor must start, sucking the gas and making the pressure go down again. Regulate the valve again, maintaining the same manner until reaching to the quantity of R-134a established for the system being charged. When the system is running, the suction pressure must be stabilized between 0.10 to 0.4 atmosphere.

1. SPECIFICATIONS

1-1 GR-S552

ITEMS		SPECIFICATIONS
NET CAPACITY (*l*)	FREEZER	114
	REFRIGERATOR	306
	TOTAL	420
DIMENSIONS (mm)		755(W)×689(D)×1777(H)
NET WEIGHT (kg)		79
COOLING SYSTEM		Fan Cooling
TEMPERATURE CONTROL		Micom Control
DEFROSTING SYSTEM		Full Automatic Heater Defrost
OUT CASE		Pre Coated Metal
INNER CASE		A B S
INSULATION		Polyurethane Foam

ITEMS		SPECIFICATIONS
SHELF	FREEZER	1 EA
	REFRIGERATOR	2 EA
VEGETABLE TRAY		Drawer Type
EGG TRAY		2 Pieces
ICE TRAY		2 Pieces (Plastic)
ICE BANK		1 Piece
COMPRESSOR		P.T.C Starting Type
EVAPORATOR		Fin Tube Type
CONDENSER		Wire Condenser
REFRIGERANT		R-134a (135g)
DEFROSTING DEVICE		HEATER

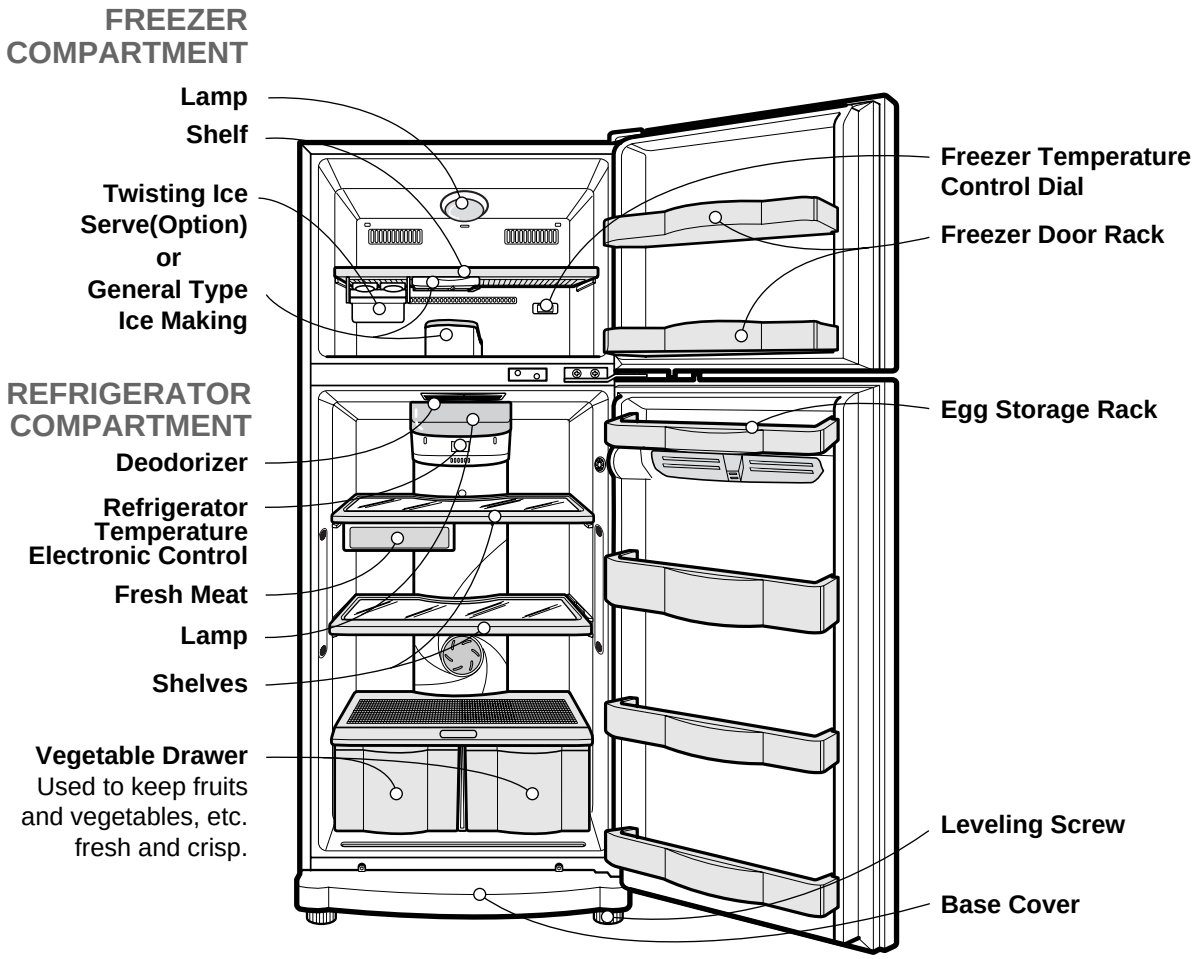
1-2 GR-S592

ITEMS		SPECIFICATIONS
NET CAPACITY (*l*)	FREEZER	126
	REFRIGERATOR	334
	TOTAL	460
DIMENSIONS (mm)		755(W)×719(D)×1777(H)
NET WEIGHT (kg)		81
COOLING SYSTEM		Fan Cooling
TEMPERATURE CONTROL		Micom Control
DEFROSTING SYSTEM		Full Automatic Heater Defrost
OUT CASE		Pre Coated Metal
INNER CASE		A B S
INSULATION		Polyurethane Foam

ITEMS		SPECIFICATIONS
SHELF	FREEZER	1 EA
	REFRIGERATOR	2 EA
VEGETABLE TRAY		Drawer Type
EGG TRAY		2 Pieces
ICE TRAY		2 Pieces (Plastic)
ICE BANK		1 Piece
COMPRESSOR		P.T.C Starting Type
EVAPORATOR		Fin Tube Type
CONDENSER		Wire Condenser
REFRIGERANT		R-134a (135g)
DEFROSTING DEVICE		HEATER

2. PARTS IDENTIFICATION

2-1 FEATURE CHART



NOTE : This is a basic model. The shape of refrigerator is subject to change.

3. DISASSEMBLY

3-1 DOOR

● **Freezer Door**

1. Remove the hinge cover by pulling it upwards.
2. Loosen hexagonal bolts fixing the upper hinge to the body and lift the freezer door.

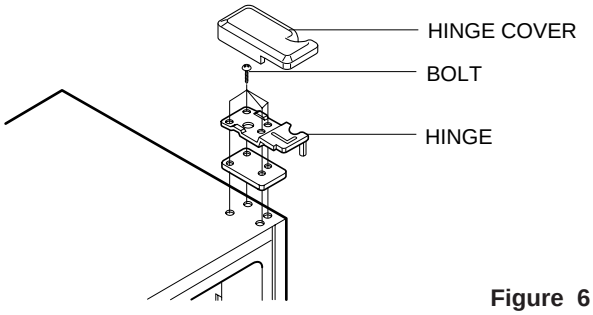


Figure 6

3. Pull out the door gasket to remove from the door foam Ass'y.

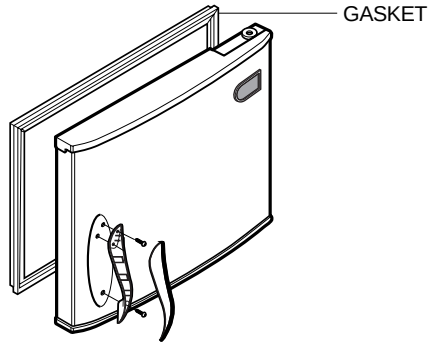


Figure 7

● **Refrigerator Door**

1. Loosen hexagonal bolts fixing the lower hinge to the body to remove the refrigerator door only.

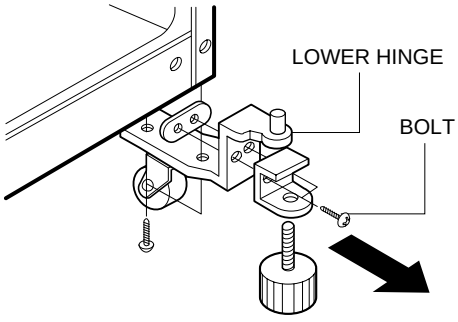


Figure 8

2. Pull out the door gasket to remove from the door foam Ass'y.

3-2 DOOR SWITCH

1. To remove the door switch, pull out it with a '—' type driver as shown in (figure 9).
2. Disconnect the lead wire from the switch.

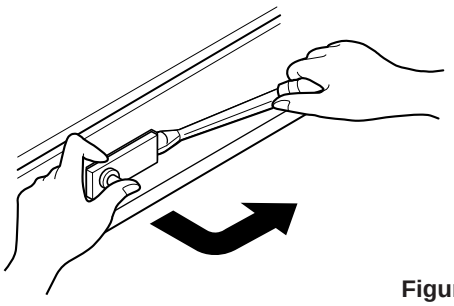


Figure 9

3-3 FAN AND FAN MOTOR

1. Remove the freezer shelf.
2. Remove the Cover Lamp-F and Case Lamp by loosening 1 screw fixed to ceiling of Inner Case.

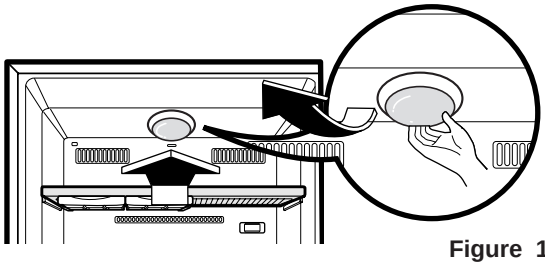


Figure 11

3. Remove the Grille by pulling it out.
4. Pull out the Shroud and remove the Fan Motor Assy by loosening 2 screws.
5. Pull out the fan and, separate the Fan Motor, Brackets and the Guide Fan.

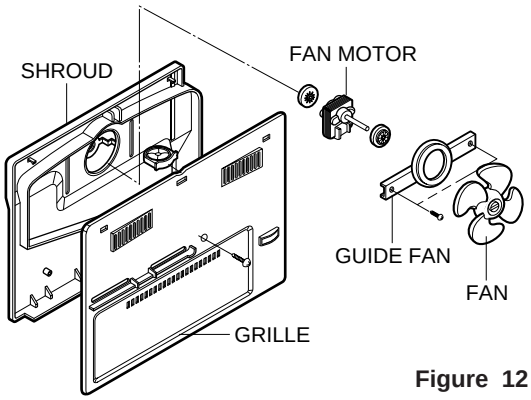


Figure 12

3-4 DEF' CONTROL ASSY

Def control ASM consists of Defrost Sensor and FUSE–M.

Defrost Sensor functions to defrost automatically and it is attached to the Evaporator and the metal side of the case senses Temp.

Fuse-M is a kind of safety device for preventing over-heating of the Heater when defrosting.

At the temperature of 77°C, it stops the emission of TEMP from the Defrost Heater.

1. Pull out the shroud-F after removing the Grille Fan. (Figure 13)
2. Separate the connectors connected with the Def Control ASM and replace the Def Control ASM after cutting the Tie Wrap. (Figure 14)

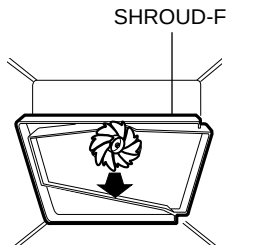


Figure 13

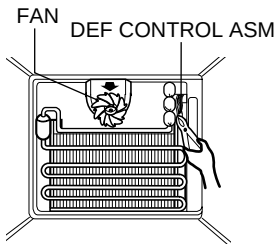


Figure 14

3-5 LAMP

FREEZER ROOM LAMP REFRIGERATOR ROOM LAMP

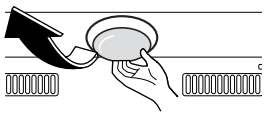


Figure 16

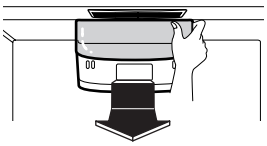


Figure 17

3-5-1 Freezer room lamp

1. Unplug the power cord from the outlet.
2. Remove the room lamp lid by taking down while pulling it forward with your hand after inserting finger into the inside hole as shown in (figure 16).
3. Remove the lamp by turning it counterclockwise.
4. Assemble in reverse order of disassembly. Replacement bulb must be the same specication as original.

3-5-2 Refrigerator room lamp

1. Unplug the power cord from the outlet.
2. Remove refrigerator shelves.
3. Remove the room lamp lid by taking down while pulling forward with your hands as shown in (figure 17).
4. Turn the lamp counterclockwise.
5. Assemble in reverse order of disassembly. Replacement bulb must be the same specification as original.

3-6 CONTROL BOX-R

1. First, remove all shelves in the refrigerator and Control Box-R by loosening 1 screw.

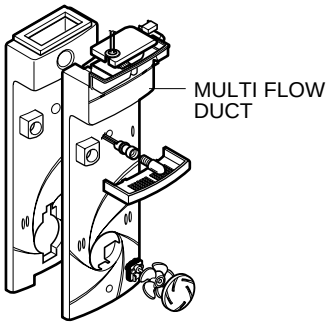


Figure 18

2. Loosen 2 screws fixing the Control Box-R to the Inner Case after detaching the cap screw.
3. Remove the Control Box-R by pulling it downward.

4. ADJUSTMENT

4-1 COMPRESSOR

4-1-1 Role

The compressor inhales low temperature and low pressure gas evaporated from Evaporator of the Refrigerator, and condenses this gas to high temperature and high pressure gas, and then plays delivering role to Condenser.

4-1-2 Composition

The Compressor is Composed of Compressor Apparatus compressing gas, Compressor Motor moving Compressor Apparatus and Case protecting Compressor Apparatus and Motor. There are PTC-Starter, and Over Load Protector (OLP) in the Compressor outside. On the other hand, because the Compressor consists of 1/1000mm processing precision components and is sealed after producing without dust or humidity, deal and repair with care.

4-1-3 Note to Use

(1) Be careful not to allow over-voltage and over-current.

(2) No Strike

If applying forcible power or strike (dropping or careless dealing), poor operation and noise may occur.

(3) Use proper electric components appropriate to the Compressor.

(4) Note to Keep Compressor.

If Compressor gets wet in the rain and rust in the pin of Hermetic Terminal, poor operation and poor contact may cause.

(5) Be careful that dust, humidity, and flux due to welding don't inflow in Compressor inside in replacing Compressor. Dust, humidity, and flux due to welding which inflows to Cylinder may cause lock and noise.

4-2 PTC-STARTER

4-2-1 Composition of PTC-Starter

(1) PTC (Positive Temperature Coefficient) is no-contact semiconductor starting device which uses ceramic material and the material consists of $BaTiO_3$.

(2) The higher the temperature is, the higher resistance value becomes . These features are used as starting device of Motor.

4-2-2 Role of PTC-Starter

(1) PTC is attached to Hermetic Compressor used for Refrigerator, Show Case and starts Motor.

(2) Compressor for household refrigerator applies single-phase induction Motor.

For normal operation of single-phase induction motor, in the starting operation flows in both main coil and sub-coil. After the starting is over, the current is cut off in subcoil. The proper features of PTC play the above all roles. So, PTC is used as a starting device of motor.

4-2-3 PTC-Applied Circuit Diagram

● **According to Starting Method of Motor**

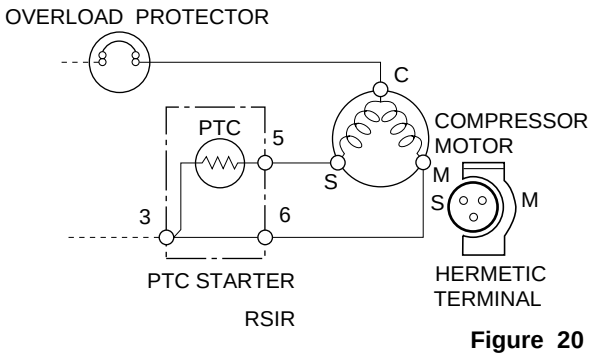


Figure 20

4-2-4 Motor Restarting and PTC Cooling

(1) For restarting after power off during normal Compressor Motor operation, plug the power cord after 5 min. for pressure balance of Refrigerating Cycle and PTC cooling.

(2) During normal operation of Compressor Motor, PTC elements generate heat continuously. Therefore, if PTC isn't cooled for a while after power off, Motor can't operate again.

4-2-5 Relation of PTC-Starter and OLP

(1) If power off during operation of Compressor and power on before PTC is cooled, (instant shut-off within 2 min. or reconnect a power plug due to misconnecting), PTC isn't cooled and a resistance value grows. As a result, current can't flow to the sub-coil and Motor can't operate and OLP operates by flowing over current in only main-coil.

(2) While the OLP repeats on and off operation about 3-5 times, PTC is cooled and Compressor Motor performs normal operation.

If OLP doesn't operate when PTC is not cooled, Compressor Motor is worn away and causes circuit-short and fire. Therefore, use a proper fixed OLP without fail.

4-2-6 Note to Use PTC-Starter

(1) Be careful not to allow over-voltage and over-current.

(2) No Strike

Don't apply a forcible power or strike.

(3) Keep apart from any liquid.

If liquid such as oil or water inflows into PTC, PTC materials it may break due to insulation breakdown of material itself.

(4) Don't change PTC at your convenience.

Don't disassemble PTC and mold. If damaging to outside of PTC-starter, resistance value alters and poor starting of compressor motor may cause.

(5) Use a properly fixed PTC.

4-3 OLP (OVER LOAD PROTECTOR)

4-3-1 Definition of OLP

(1) OLP (OVER LOAD PROTECTOR) is attached to Hermetic Compressor and protects Motor by cutting off current in Compressor Motor by Bimetal in the OLP in case of over-rising temperature.

(2) When over-voltage flows to Compressor motor, Bimetal works by heating the heater inside OLP, and OLP protects Motor by cutting off current which flows to Compressor Motor.

4-3-2 Role of OLP

(1) OLP is attached to Hermetic Compressor used to Refrigerator and Show Case and prevents Motor Coil from being started in the Compressor.

(2) Do not turn the Adjust Screw of OLP in any way for normal operation of OLP.
(Composition and connection Diagram of OLP)

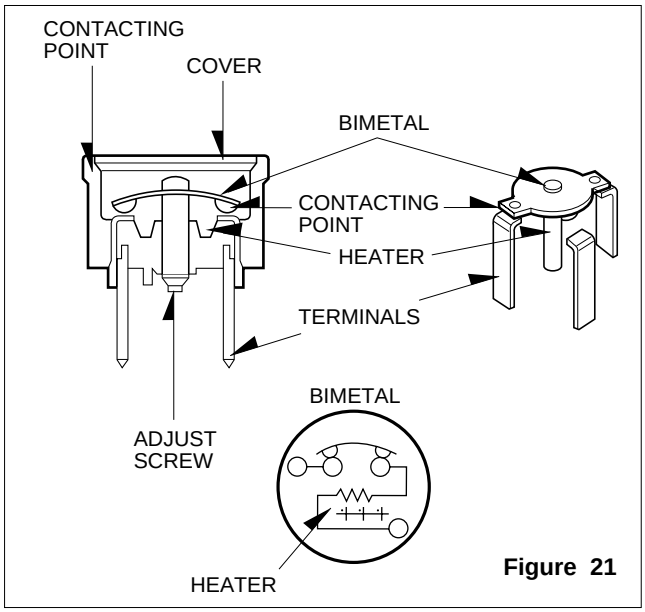
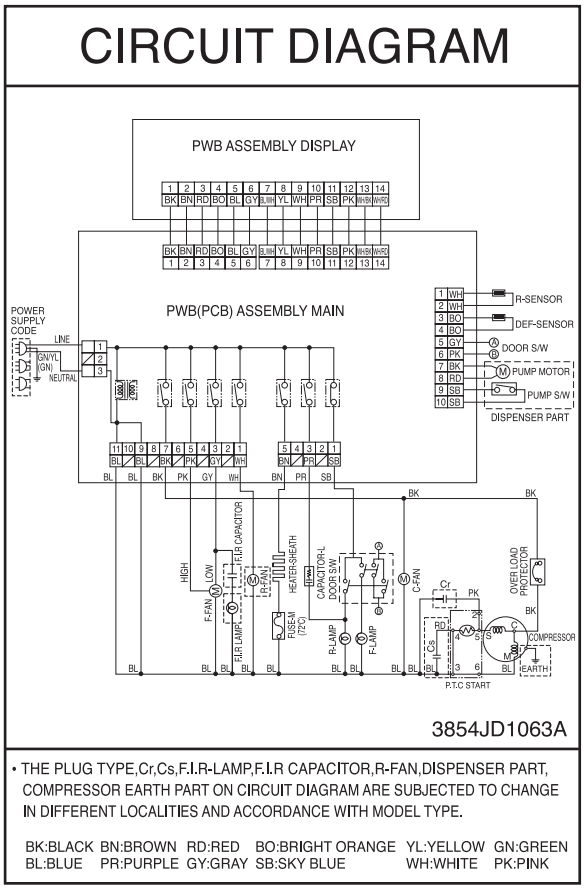


Figure 21

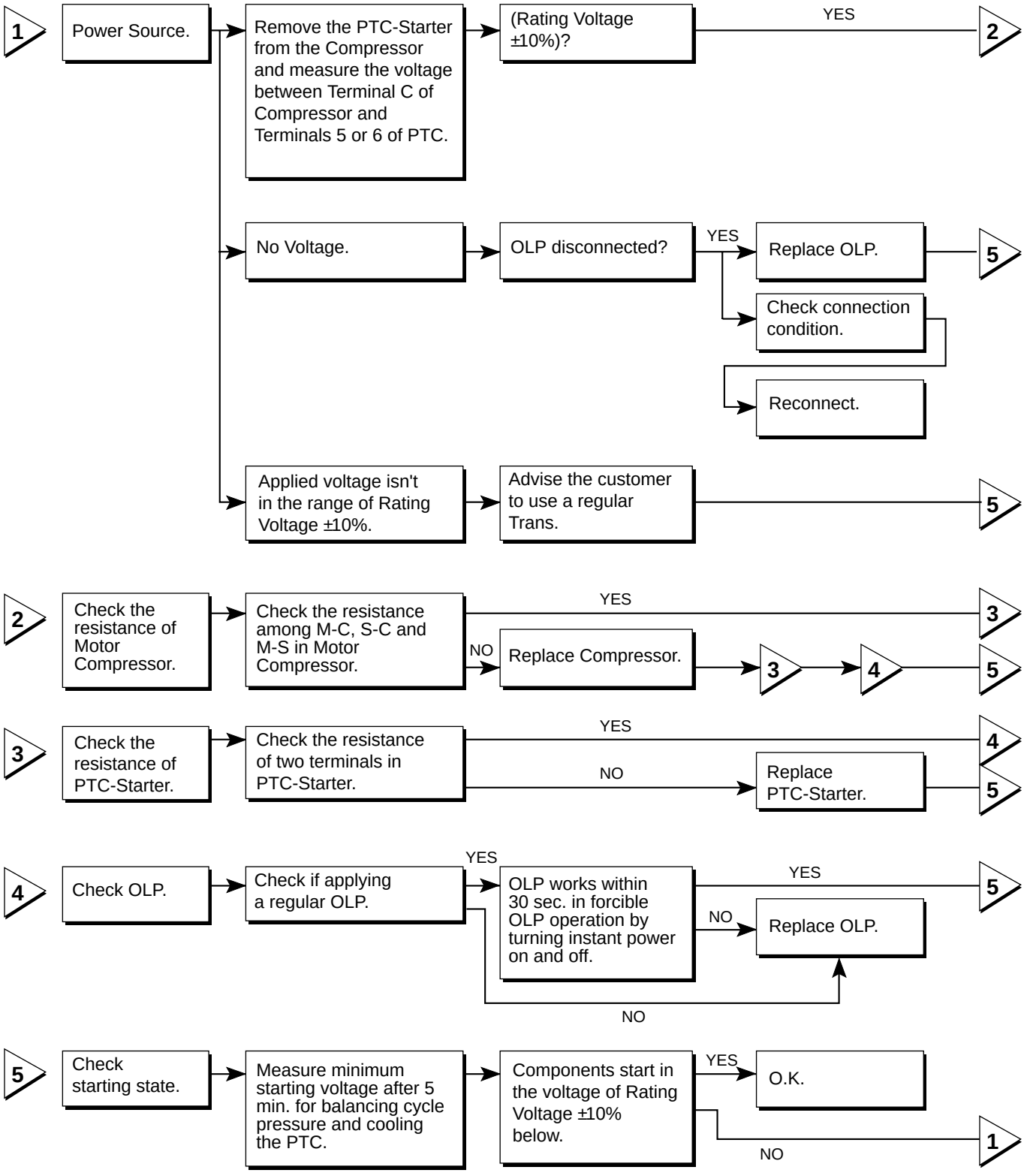
5. CIRCUIT DIAGRAM



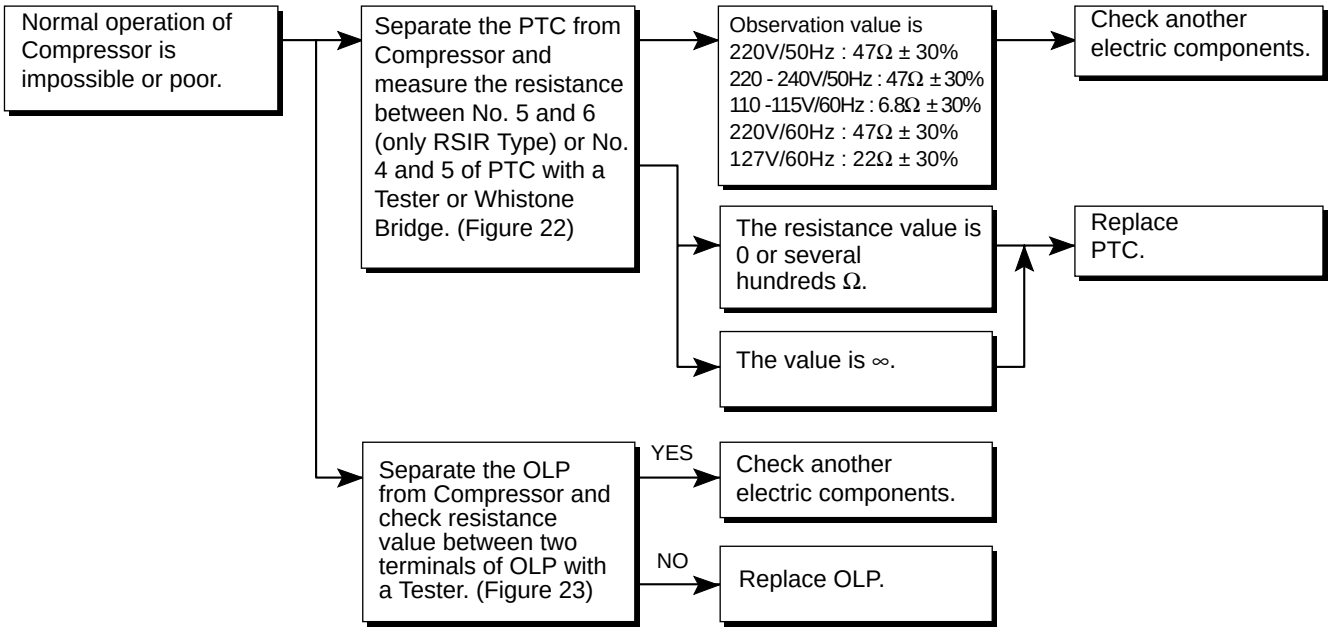
NOTE : 1. This is a basic diagram and specifications vary in different localities.

6. TROUBLESHOOTING

6-1 COMPRESSOR AND ELECTRIC COMPONENTS



6-2 PTC AND OLP



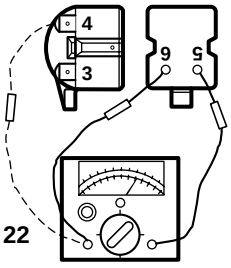


Figure 22

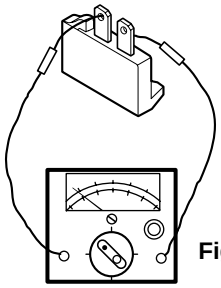
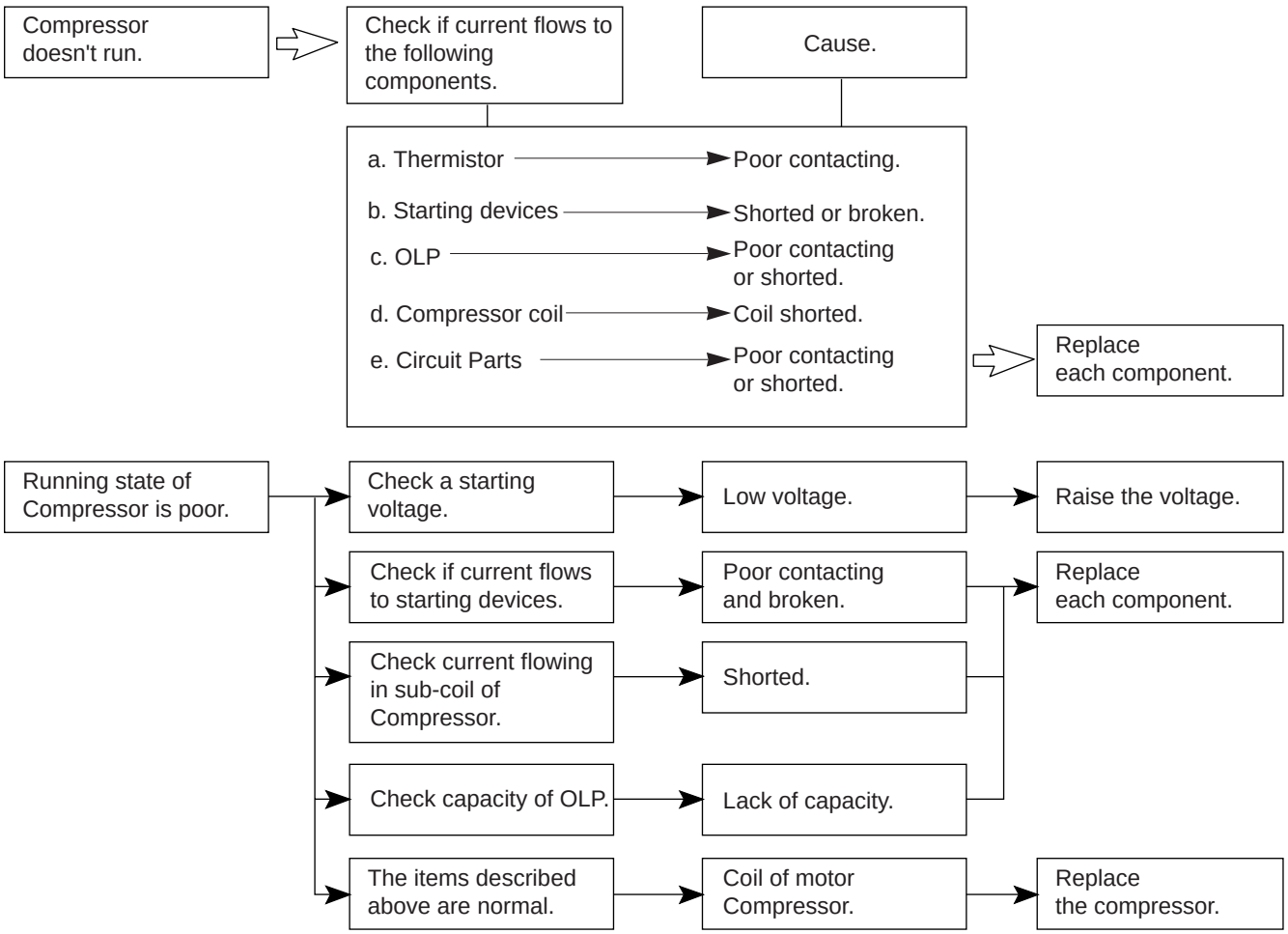


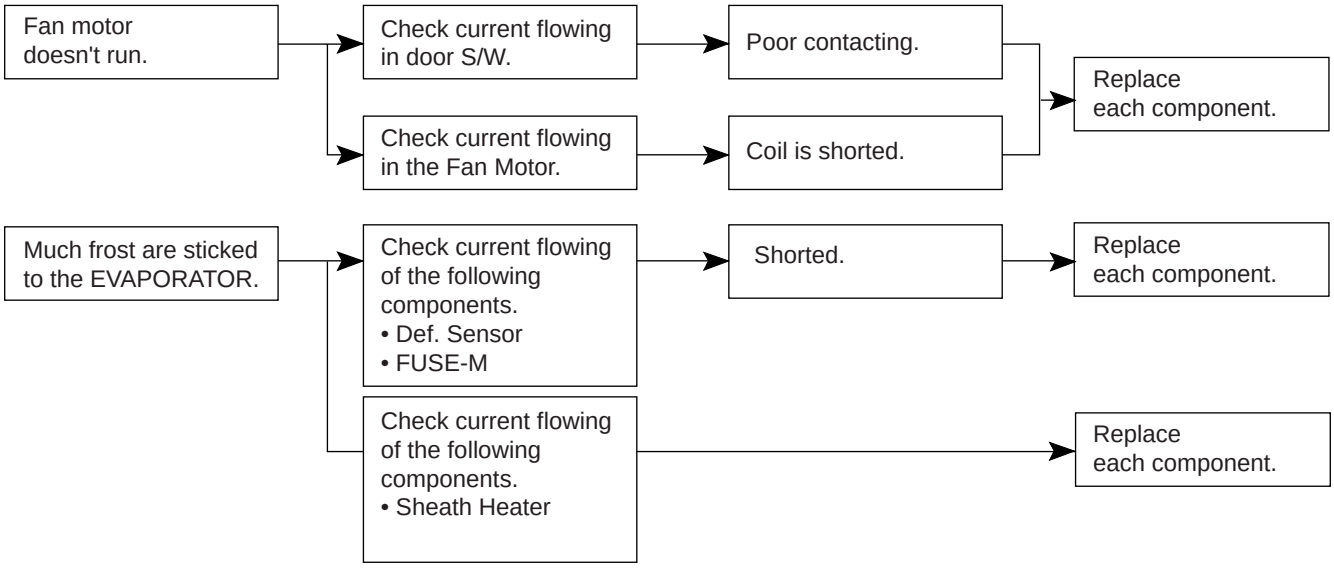
Figure 23

6-3 ANOTHER ELECTRIC COMPONENTS

▼ Cooling is impossible



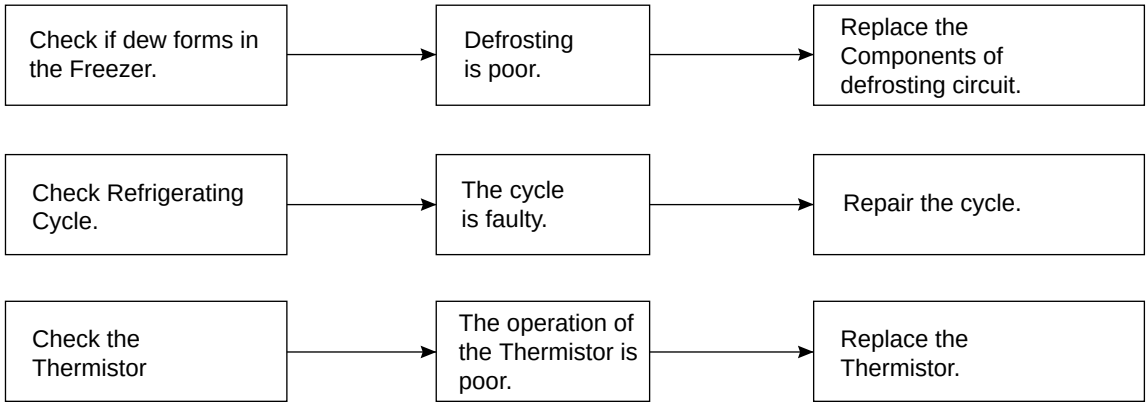
▼ Cooling ability is poor



6-4 SERVICE DIAGNOSIS CHART

COMPLAINT	POINTS TO BE CHECKED	REMEDY
Cooling is impossible.	• Is the power cord unplugged from the outlet? • Check if the power S/W is set to OFF. • Check if the fuse of power S/W is shorted. • Measure the voltage of power outlet.	• Plug to the outlet. • Set the switch to ON. • Replace a regular fuse. • If voltage is low, wire newly.
Cooling ability is poor.	• Check if the set is placed close to wall. • Check if the set is placed close to stove, gas cooker and direct rays. • Is the ambient temperature high or the room door closed? • Check if putting in hot foods. • Did you open the door of the set too often or check if the door is closed up? • Check if the Control is set to "Min".	• Place the set with the space of about 10cm. • Place the set apart from these heat appliances. • Make the ambient temperature below. • Put in foods after they get cold. • Don't open the door too often and close it firmly. • Set the control to mid-position.
Foods in the Refrigerator are frozen.	• Are foods placed in cooling air outlet? • Check if the Display LED is set to "Max". • Is the ambient temperature below 5°C?	• Place foods in high temperature section. (Front Part) • Set the Display LED to "Mid". • Set the Display LED to "Min".
Dew or ice forms in the chamber of the set.	• Is watery foods kept? • Check if putting in hot foods. • Did you open the door of the set too often or check if the door is closed up.	• Seal up watery foods with wrap. • Put in foods after they get cold. • Don't open the door too often and close it firmly.
Dew forms in the Out Case.	• Check if ambient temperature and humidity of surroumcling air are high. • Is the gap in the door packed?	• Wipe dew with a dry cloth. This happening is solved in low temperature and humidity naturally. • Fill up the gap.
Abnormal noise generates.	• Is the set positioned in a firm and even place? • Does any unnecessary objects exist in the back side of the set? • Check if the Drip Tray is not firmly fixed. • Check if the cover of mechanical room in below and front side is taken out.	• Adjust the Adjust Screw, and position in the firm place. • Remove the objects. • Fix it firmly on an original position. • Place the cover at an original position.
To close the door is not handy.	• Check if the door packing becomes dirty by filth such as juice. • Is the set positioned in a firm and even place? • Is too much food putted in the set?	• Clean the door packing. • Position in the firm place and adjust the Adjust Screw. • Keep foods not to reach the door.
Ice and foods smell unpleasant.	• Check if the inside of the set becomes dirty. • Did you keep smelly foods without wraping? • It smells plastic.	• Clean the inside of the set. • Wrap smelly foods. • The new products smell plastic, but it is removed after 1-2 weeks.

● In addition to the items described left, refer to the followings to solve the complaint.



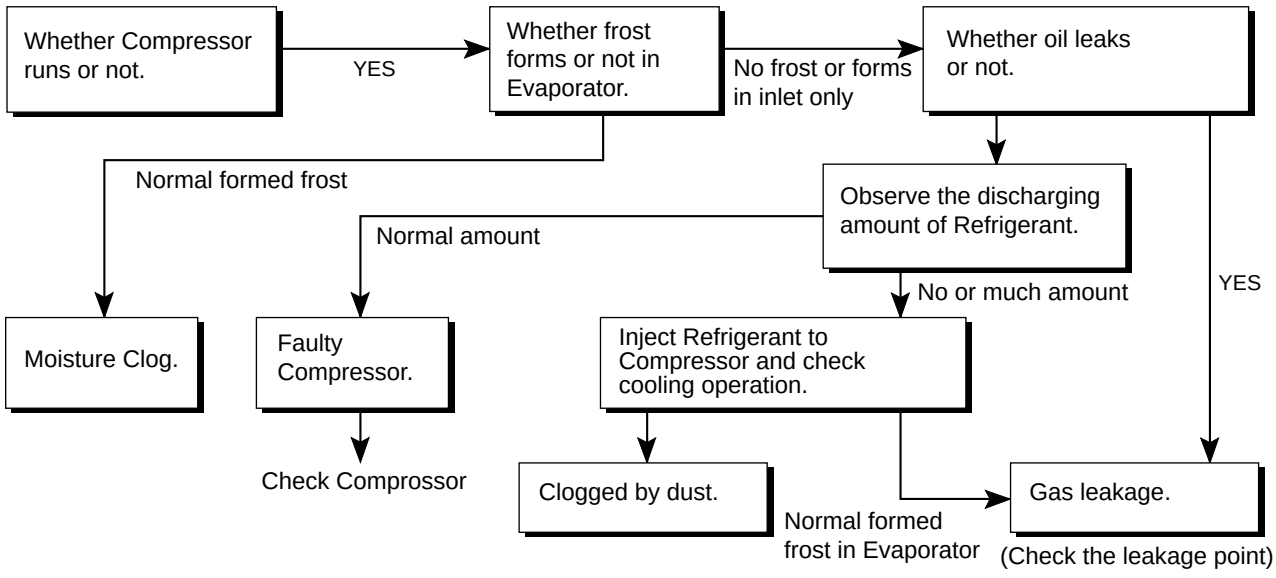
6-5 REFRIGERATING CYCLE

▼ Troubleshooting Chart

CAUSE		STATE OF THE SET	STATE OF THE EVAPORATOR	TEMPERATURE OF THE COMPRESSOR	REMARKS
LEAKAGE	PARTIAL LEAKAGE	Freezer and Refrigerator don't get cold normally.	Low flowing sound of Refrigerant is heard and frost forms in inlet only	A little high more than ambient temperature.	• A little Refrigerant discharges. • Normal cooling is possible when injecting Refrigerant of regular amount.
	WHOLE LEAKAGE	Freezer and Refrigerator don't get cold at all.	Flowing sound of Refrigerant is not heard and frost isn't formed.	Equal to ambient temperature.	• No discharging of Refrigerant. • Normal cooling is possible when injecting Refrigerant of regular amount.
CLOGGED BY DUST	PARTIAL CLOG	Freeze room and Refrigerator don't get cold normally.	Flowing sound of Refrigerant is heard and frost forms in inlet only.	A little high more than ambient temperature.	• Normal discharging of refrigerant. • The capillary tube is faulty.
	WHOLE CLOG	Freezer and Refrigerator don't get cold.	Flowing sound of Refrigerant is not heard and frost isn't formed.	Equal to ambient temperature.	• Normal discharging of Refrigerant.
MOISTURE CLOG		Cooling operation stops periodically.	Flowing sound of Refrigerant is not heard and frost melts.	Low than ambient temperature	• Cooling operation restarts when heating the inlet of capillary tube.
DEFECTIVE COMPRESSION	COMP-RESSION	Freezer and Refrigerator don't get cold.	Low flowing sound of Refrigerant is heard and frost forms in inlet only.	A little high than ambient temperature.	• The pressure of high pressure part in compressor is low.
	NO COMP-RESSION	No compressing operation.	Flowing sound of Refrigerant is not heard and no frost.	Equal to ambient temperature.	• No pressure of high pressure part in compressor.

▼ Leakage Detection

Observe discharging point of refrigerant which may be in oil discharging part in compressor and hole of evaporator.



▼ General Control of Refrigerating Cycle

NO.	ITEMS	CONTENTS AND SPECIFICATIONS	REMARKS
1	WELDING ROD	(1) H 30 • Chemical Ingredients Ag: 30%, Cu: 27%, Zn: 23%, Cd: 20% • Brazing Temperature: 710~840°C (2) Bcup-2 • Chemical Ingredients Cu: About 93% P: 6.8~7.5% The rest: within 0.2% • Brazing Temperature: 735~840°C	• Recommend H34 containing 34% Ag in the Service Center.
2	FLUX	• Ingredients and how to make Borax 30% Borax 35% Fluoridation kalium: 35% Water: 4% Mix the above ingredients and boil until they are transformed into liquid.	• Make amount for only a day. Holding period: 1 day • Close the cover of container to prevent dust putting in the FLUX. • Keep it in a stainless steel container.
3	DRIER ASM	(1) Assemble the drier within 30min. after unpacking. (2) Keep the unpacked drier at the temperature of 80~100°C.	• Don't keep the drier in a outdoor because humidity damages to it.
4	VACUUM	(1) When measuring with pirant Vacuum gauge of charging M/C, vacuum degree is within 1 Torr. (2) If the vacuum degree of the cycle inside is 10 Torr. below for low pressure and 20 Torr. for high pressure, it says no vacuum leakage state. (3) Vacuum degree of vacuum pump must be 0.05 Torr. below after 5 min. (4) Vacuum degree must be same to the value described item (2) above for more than 20 min.	• Apply M/C Vacuum Gauge without fail. • Perform vacuum operation until a proper vacuum degree is built up. • If a proper vacuum degree isn't built up, check the leakage from the Cycle Pipe line part and Quick Coupler Connecting part.
5	DRY AND AIR NITROGEN GAS	(1) The pressure of dry air must be more than 12~16Kg/cm^2 (2) Temperature must be more than -20~-70°C. (3) Keep the pressure to 12~6Kg/cm^2 also when substituting dry air for Nitrogen Gas.	
6	NIPPLE AND COUPLER	(1) Check if gas leaks with soapy water. (2) Replace Quick Coupler in case of leakage.	• Check if gas leaks from connecting part of Coupler.
7	PIPE	• Put all Joint Pipe in a clean box and cover tightly with the lid so that dust or humidity is not inserted.	

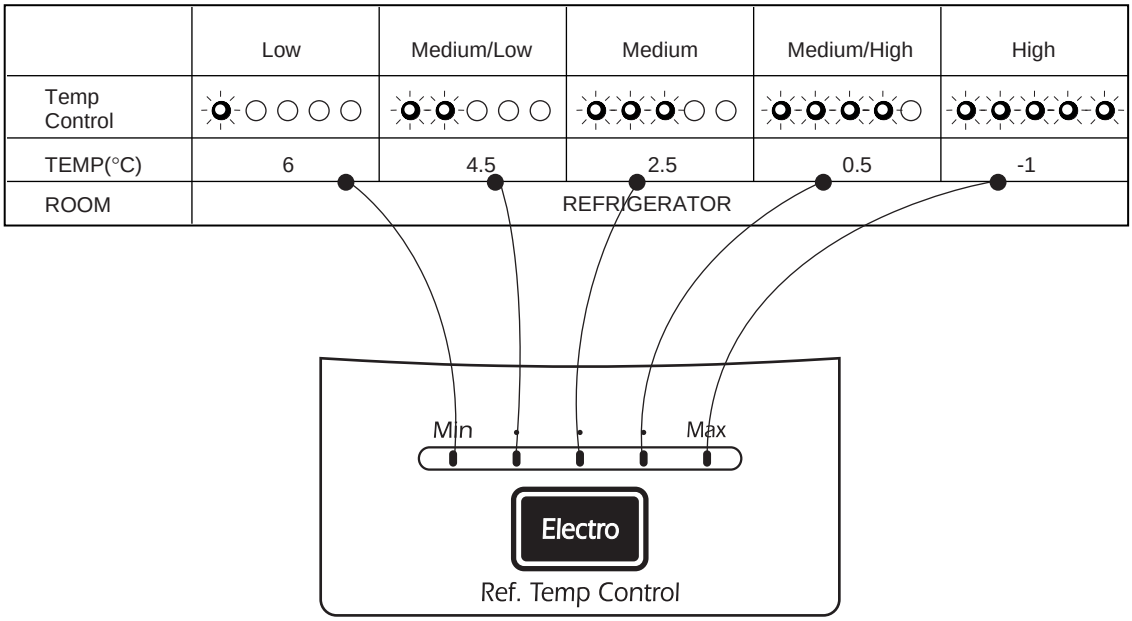
7. DESCRIPTION OF FUNCTION & CIRCUIT OF MICOM

The following description is basically for GR-S552/GR-S592. For the other models, refer to the diagram of the entire PCB circuit.

7-1 FUNCTION

7-1-1 FUNCTION

1. When the appliance is plugged in, it is set to 'Medium'. Each time the button is pushed, it is set to **'Medium'→'Medium/High'→'High'→'Low'→'Medium/Low'→'Medium'** in order.
2. When the power is initially applied or restored after a power failure, it is automatically set to **'Medium'**.



7-1-2 CONTROL OF VARIABLE SPEED FAN IN THE FREEZER COMPARTMENT

1. Fan motor in the freezer compartment shall change from standard to high speed rpm in order to increase cooling speed and load corresponding speed.
2. High speed rpm is only used for the initial power application and load corresponding operation. But standard rpm is used in the general working condition.
3. When the door of freezer room or refrigerator room is opened, the fan motor is stoped immediately, then when the door is closed, the fan motor is operated.

7-1-3 CONTROL OF DOUBLE COOLING FAN IN THE REFRIGERATOR COMPARTMENT

1. To raise the refrigerating speed, fan motor in the refrigerator compartment is operated when the door of freezer room or refrigerator room is opened and then closed.
2. The fan motor is stoped after 20 sec. When the door is dosed.

7-1-4 DEFROSTING

1. The defrosting is performed each time when the total running time of the compressor reaches 7 hours.
2. After the power is turned on (or restored after a power failure), the defrosting starts when the total running time of the compressor reaches 4 hours.
3. When the temperature of the defrosting sensor reaches 10 °C or above, the defrosting stops. If the temperature does not reach 10 °C in 2 hours after the defrosting starts, the defrosting error code is displayed.
   (Refer to 7-1-6 Error Diagnostic Mode.)
4. With the defective defrosting sensor (cut or short-circuited wire), the defrosting will not be performed.

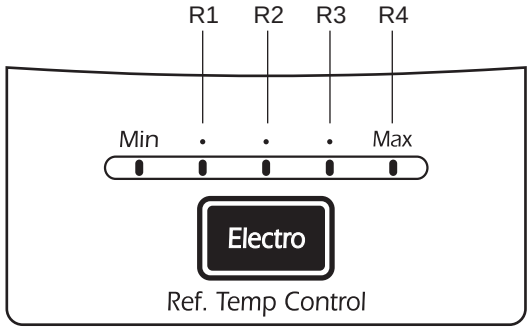
7-1-5 SEQUENTIAL OPERATION OF ELECTRIC COMPONENTS

The electric components, such as the comp, defrosting heater, and cooling fan, start sequentially to avoid the noise and damage to the part, which may result from the simultaneous start of various components on turning the power on or after the completion of a test.

Condition of Operation		Operating Sequence
When the power is turned on	If the temp of the defrosting sensor is 45 °C or above (For the initial use after the purchase or grounding)	**POWER ON** → (in 0.5 sec) **COMP & COOLING FAN ON**
	If the temp of the defrosting sensor is below 45 °C (After a power failure or SVC)	**POWER ON** → (in 0.5 sec) **DEFROSTING HEATER ON** → (in 10 sec) **DEFROSTING HEATER OFF** → (in 0.5 sec) **COMP & COOLING FAN ON**

7-1-6 ERROR DIAGNOSTIC MODE

1. The error diagnostic mode allows the SVC when a fault that may affect the performance of the product occurs while operating the product.
2. Even if the function control button is pushed when an error occurs, the function will not be performed.
3. When the error is cleared while the error code is displayed due to a fault, the appliance returns to the normal condition (Reset).
4. The error code is displayed by the refrigerator temp indication LED on the display of the refrigerator while the remaining LEDs are off.

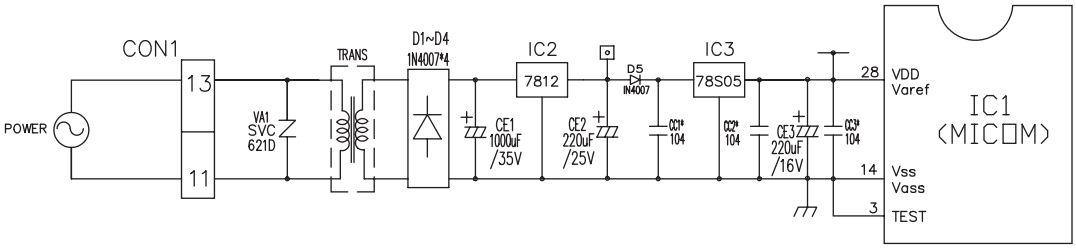


○ : ON ● : OFF

NO	Error	Error Code Display				Cause	State of Operation with Error	
		R1	R2	R3	R4		Comp / Cooling fan	Defrosting heater
1.	Faulty refrigerator(R) sensor (on the control box of the refrigerator)	●	○	●	●	Cut or short-circuited wire of refrigerator sensor	15 min ON/ 15 min OFF	○
2.	Faulty defrosting sensor	●	●	○	●	Cut or short-circuited wire of defrosting sensor	○	No defrosting
3.	Defrosting failure	○	○	○	○	Cut or disconnected wire of defrosting heater or temperature fuse(indicated at least 2 hours later after the error occurs)	○	○

7-2 PCB FUNCTION

7-2-1 POWER CIRCUIT



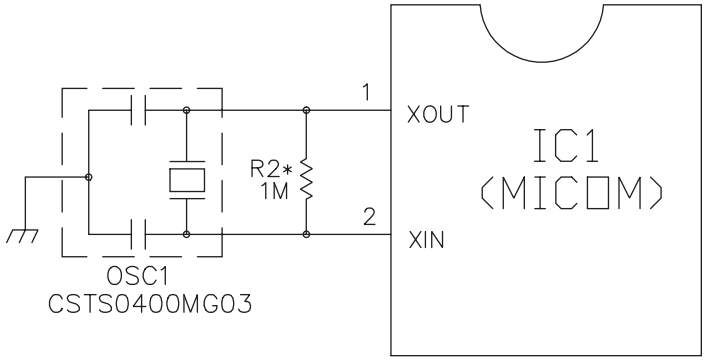
The secondary part of the TRANS is composed of the power supply for the display and relay drive (12Vdc) and that for the MICOM and IC (5Vdc).

The voltage for each part is as follows.

PART	VA 1	CE 2	CE3
VOLTAGE	220 Vac	12 Vdc	5 Vdc

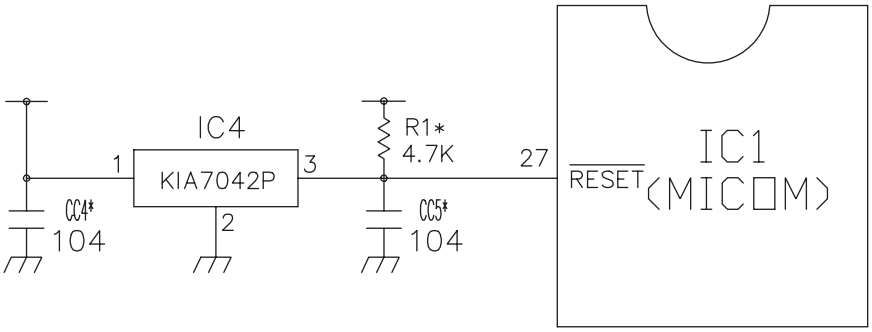
VA1 is a part for preventing the over voltage and noise. When 385V or higher power is applied, the inside elements are short-circuited and broken, resulting in the blowout of the fuse in order to protect the elements of the secondary part of the TRANS.

7-2-2 OSCILLATION CIRCUIT



This circuit is to generate the base clock for calculating time and the synchro clock for transmitting data from and to the inside logic elements of the IC1(MICOM). Be sure to use the authentic parts since the calculating time by the IC1 may be changed or it will not work if the OSC1 SPEC is changed.

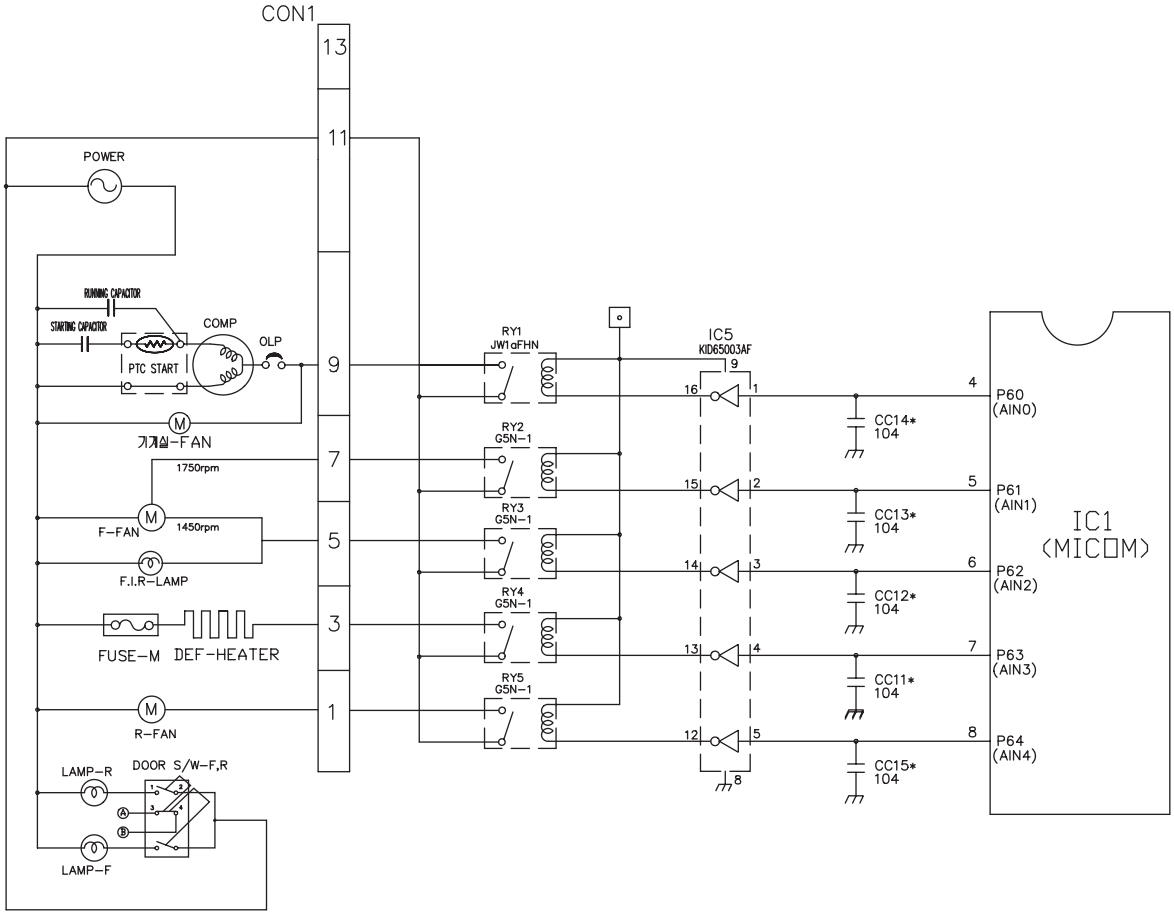
7-2-3 RESET CIRCUIT



The RESET circuit is for allowing all the functions to start at the initial conditions by initializing various parts including the RAM inside the MICOM (IC1) when the power is initially supplied or the power supply to the MICOM is restored after a momentary power failure. For the initial 10ms of power supply, 'LOW' voltage is applied to the MICOM RESET terminal. During a normal operation, 5V is applied to the RESET terminal. (If a trouble occurs in the RESET IC, the MICOM will not work.)

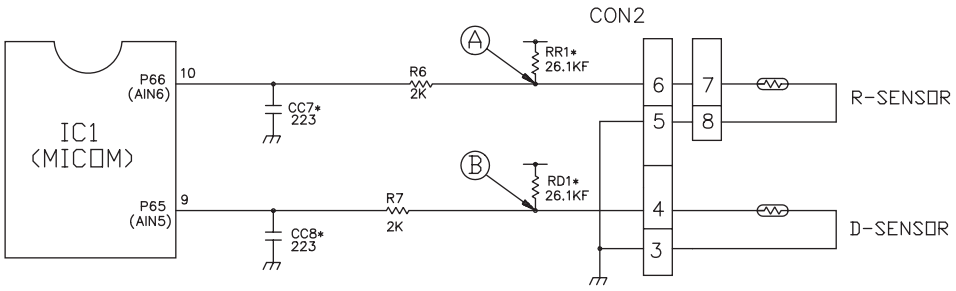
7-2-4 LOAD DRIVE CIRCUIT

1. Load Drive Condition Check



Load Type		Comp	Defrosting Heater	Freezer Fan Motor		Double Cooling
				High RPM	Standard RPM	Fan Motor (R-Fan)
Measurement Location (IC5)		No. 16	No. 13	No. 15	No. 14	No. 12
Condition	ON	1V or below				
	OFF	12V				

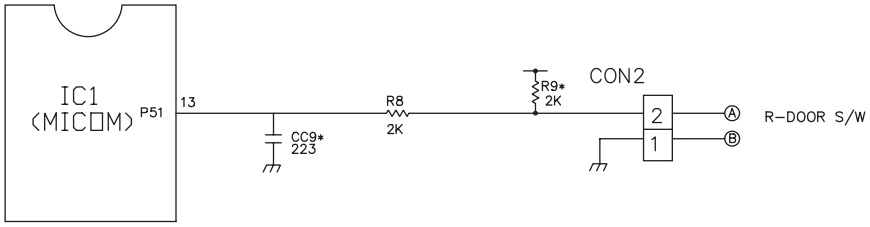
7-2-5 TEMPERATURE SENSOR CIRCUIT



The upper CIRCUIT reads REFRIGERATOR temperature and DEF-SENSOR temperature for defrosting into MICOM. OPENING or SHORT state of each TEMPERATURE SENSOR are as follows.

SENSOR	CHECK POINT	NORMAL(-30 °C ~ 50 °C)	SHORT-CIRCUITED	OPEN
Refrigerator Sensor	POINT Ⓐ Voltage	0.5 V ~ 4.5 V	0 V	5 V
Defrosting Sensor	POINT Ⓑ Voltage			

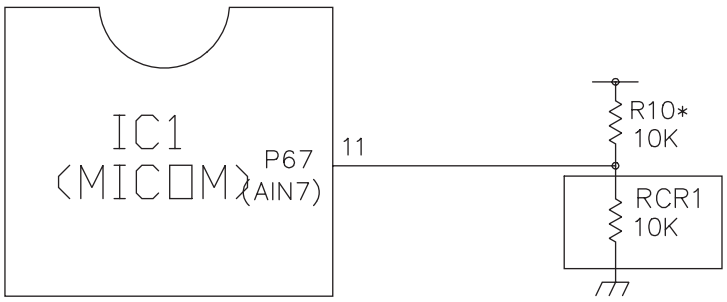
7-2-6 DOOR OPEN DETECTION CIRCUIT



Measurement Location / Freezer / Refrigerator Door	(Pin No.13)
Closed	0V
Open	5V

7-2-7 TEMPERATURE COMPENSATION & OVERCOOLING/UNDERCOOLING COMPENSATION CIRCUIT

1. Refrigerator Temperature Compensation

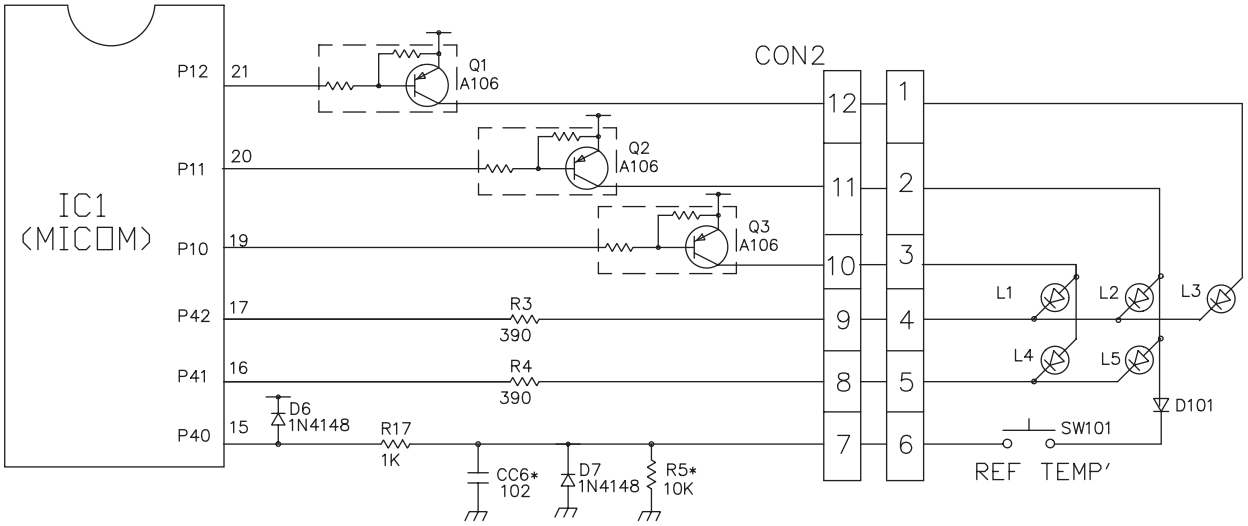


Refrigerator		Remark
Resistance (RCR1)	**Temperature Compensation**	
180 KΩ	+2.5 °C	Compensation by raising the temperature ↑
56 KΩ	+2.0 °C	
33 KΩ	+1.5 °C	
18 KΩ	+1.0 °C	
12 KΩ	+0.5 °C	
10 KΩ	0 °C	Standard Temperature
8.2 KΩ	-0.5 °C	Compensation by lowering the temperature ↓
5.6 KΩ	-1.0 °C	
3.3 KΩ	-1.5 °C	
2 KΩ	-2.0 °C	
470 Ω	-2.5 °C	

◗ Table of Temperature Compensation by adjusting the resistance (Difference with the current temperature)

E.g.) If the refrigerator compensation resistance (RCR1) is changed from 10K (the current resistance) to 18K (the adjustment resistance), the temperature of the refrigerator rises +1.0 °C.

7-2-8 KEY BUTTON INPUT & DISPLAY LIGHT ON CIRCUIT



◗ The circuit shown above is to determine whether a function control key on the operation display is pushed and to turn on the corresponding function indication LED. The drive type is the scan type.

7-3 RESISTANCE SPECIFICATION OF SENSOR

TEMPERATURE SENSOR	RESISTANCE OF REFRIGERATOR (DEFROST) SENSOR
- 20 ˚C	77 KΩ
- 15 ˚C	60 KΩ
- 10 ˚C	47.3 KΩ
- 5 ˚C	38.4 KΩ
0 ˚C	30 KΩ
+ 5 ˚C	24.1 KΩ
+ 10 ˚C	19.5 KΩ
+ 15 ˚C	15.9 KΩ
+ 20 ˚C	13 KΩ
+ 25 ˚C	11 KΩ
+ 30 ˚C	8.9 KΩ
+ 40 ˚C	6.2 KΩ
+ 50 ˚C	4.3 KΩ

• The resistance of SENSOR has ±5% common difference.
• Measure the resistance of SENSOR after leaving it over 3 minutes in measuring temperature.
This postponing is necessary because of perceiving speed.

7-4 TROUBLE SHOOTING

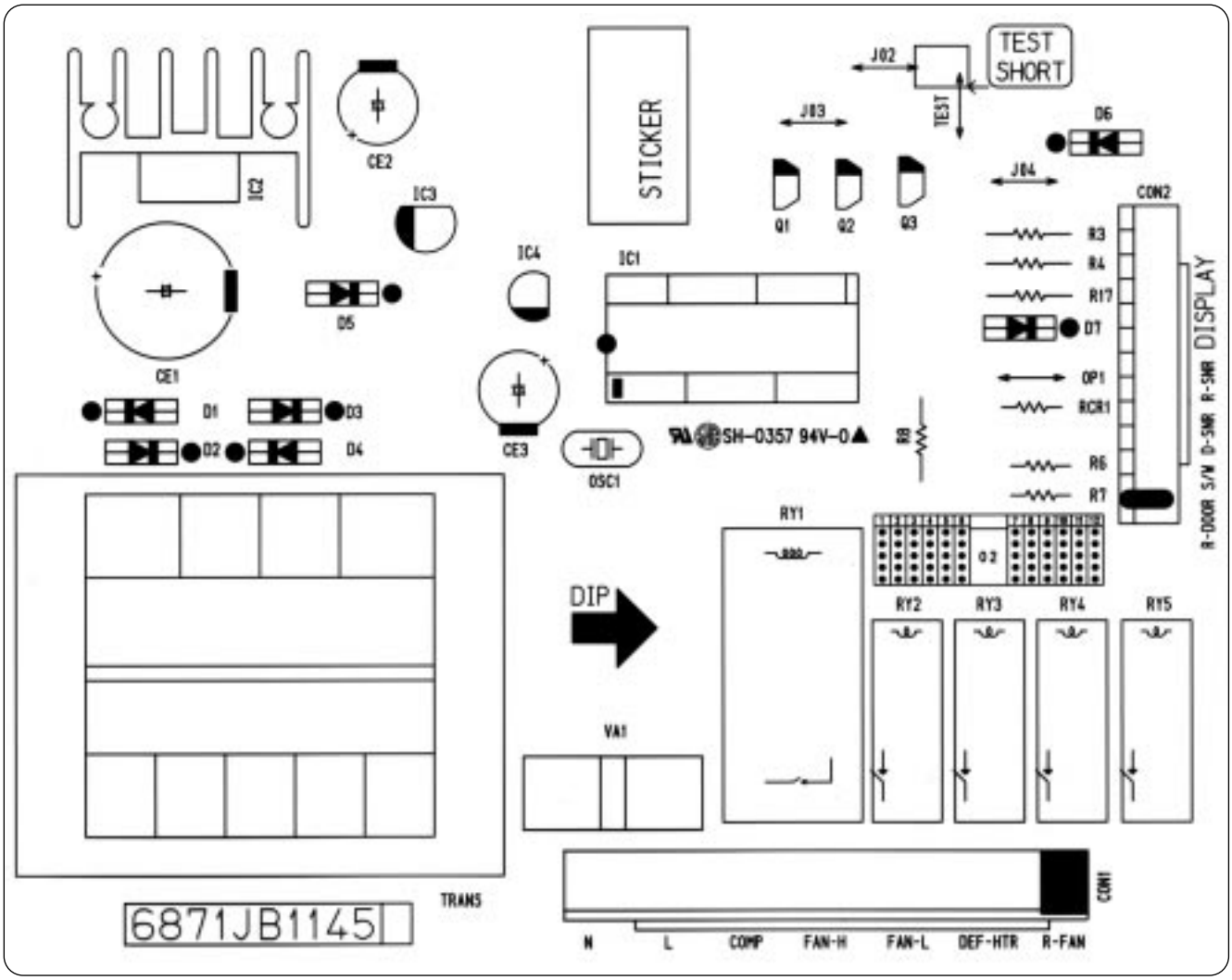
• Replace PCB when no trouble after checking the contents of trouble.

CLASSIFICATION	STATE OF TROUBLE	POINT BE CHECKED	CHECKING METHOD	CONTENT	REMEDY
POWER SOURCE is poor	1. All the DISPLAY LED OFF 2. DISPLAY LED represents abnormal operation.	1. FREEZER/ REFRIGERATOR	FREEZER/REFRIGERATOR DOOR OPEN	POWER SOURCE is poor	Certify Fuse. Certify outlet Voltage.
		2. LAMP is dim.	CHECK with the naked.	Applied voltage mistake	Use boosting TRANS.
		3. The connection of CONNECTOR of MAIN PWB.	Certify connection of CONNECTOR.	CONNECTOR connection is poor.	Reconnect CONNECTOR.
				TRANS FUSE open.	Replace TRANS.
COOLING is poor	NO COOLING	1. COMPRESSOR operates?	Check the MAIN PCB.	COMPRESSOR lock or blocked.	Replace COMPRESSOR.
				OLP, PTC is poor.	Replace OLP, PTC.
				COMPRESSOR RELAY is poor	Replace MAIN PWB RY1
				THE CONNECTING WIRE is poor.	Certify the black wire of MAIN PWB CONNECTOR (CON1)
		2. Whether refrigerant leaks or leaks or not.	Measure the amount of frost sticking on EVA and the surface temperature of condenser pipe.	Refrigerant leakage.	Remedy the leaking part and reaching Refrigerant.
	FREEZER TEMPERATURE is poor	1. Whether FAN MOTOR operates or not.	Check the MAIN PCB.	FAN MOTOR is poor	Replace FAN MOTOR.
				DOOR LINE contact.	Replace DOOR LINER.
				CONETTING WIRE is poor.	Certify MOTOR and the connection of the black wire of MAIN PWB CONNECTOR. (CON1)
		2. DEFROSTING normal?	Certify the amount of frost sticking on EVA.	DEFROSTING is poor.	See the DEFROSTING trouble.
		3. SENSOR normal?	Check resistance the SENSOR in the Refrigerator	SENSOR RESISTANCE is poor.	Replace SENSOR

CLASSIFICATION	STATE OF TROUBLE	POINT BE CHECKED	CHECKING METHOD	CONTENT	REMEDY
COOLING is poor.	REFRIGERATOR TEMPERATURE is poor.	1. FREEZER TEMPERATURE is normal?	See "FREEZER TEMPERATURE is poor".		Certify the attaching state of DOOR.
		2. Cool air of FAN MOTOR is is sufficient?	Certify the amount of cool air and its speed touching check supplied into REFRIGERATOR	FAN MOTOR is poor.	Replace FAN MOTOR.
				Passage of cool air blocking.	Remove impurities.
				EVA frozen.	See "DEFROSTING is poor".
DEFROSTING is poor.	NO DEFROSTING.	1. HEATER emit heat?	Check the MAIN PCB.	HEATER disconnection.	Replace HEATER.
				TEMPERATURE FUSE disconnection.	Replace TEMPERATURE FUSE.
				Connection is poor.	Certify EVA connection and wire of MAIN PWB CONNECTOR (CON1)
				DEF-SENSOR is poor.	Replace DEF-SENSOR.
				HEATER RELAY is poor.	Replace RY4 of MAIN PWB.
		2. DRAIN PIPE blocking?	Certify DRAIN PIPE.	DRAIN PIPE blocking.	Remove ice and impurities.
					Certify HEATER PLATE resistance.
		3. Remain ice at DEFROSTING?	Certify the attaching of DEF-SENSOR.	Attaching is poor.	Reassemble DEF-SENSOR.
			Certify the attaching state(gap) of FREEZER/ REFRIGERATOR DOOR.	DOOR sticking is poor.	Reassemble DOOR.
					Replace GASKET.

7-5 MAIN PWB ASS'Y AND PARTS LIST

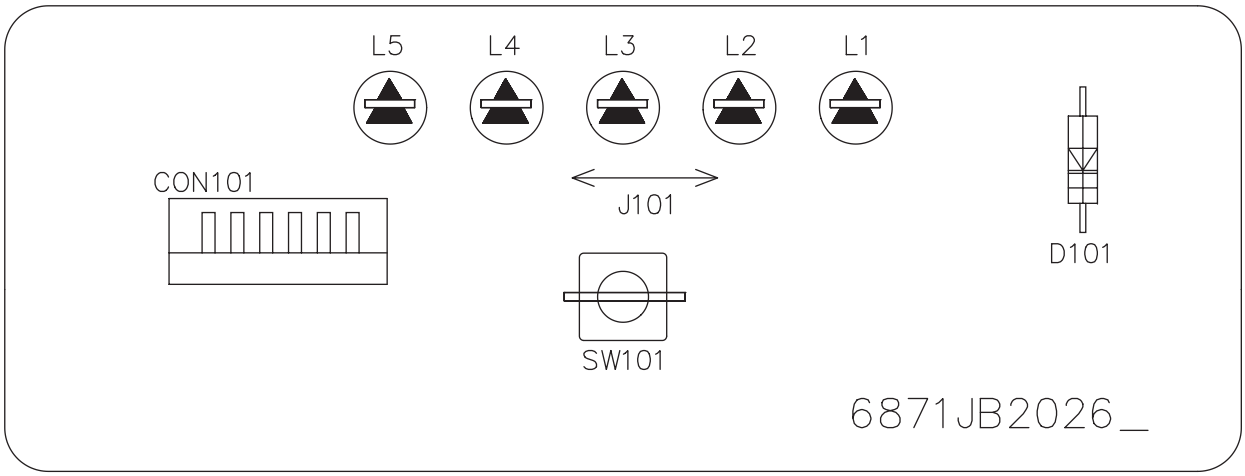
7-5-1 MAIN PWB ASS'Y



7-5-2 REPLACEMENT PARTS LIST

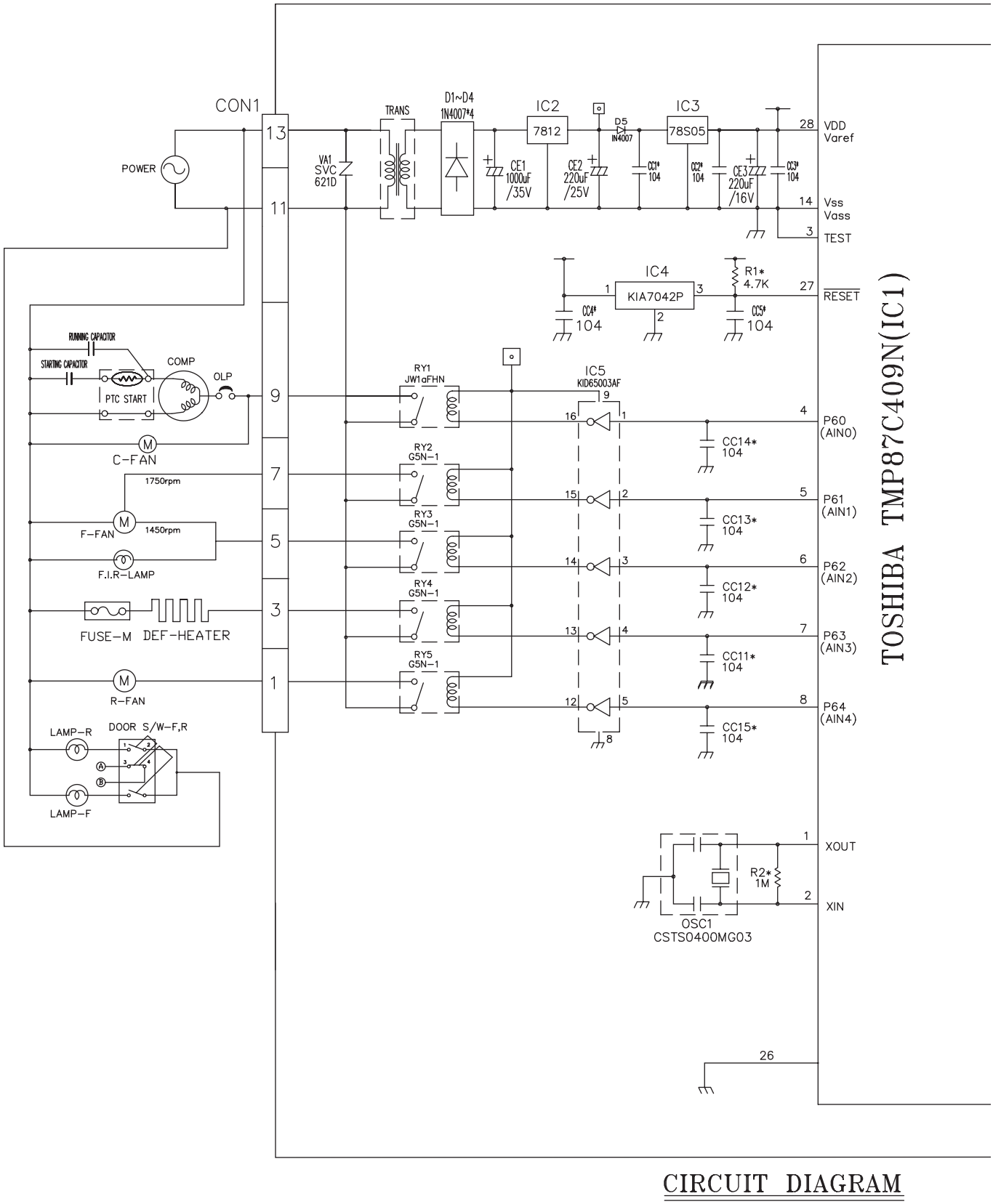
No	P/N□	DESCRIPTI□N	SPEC	MAKER	REMARK
1	6870JB8025E	PWB(PCB)	GR-S592,552 BP3,4-PJT (GUIDE H□LE)	D□□ SAN	T=1.6
2	6170JB2017B	TRANSF□RMER,L□W V□LTAGE	260V 15V YES 180MA	TAE SUNG	TRANS
3	6170JB2017A	TRANSF□RMER,L□W V□LTAGE	240V 15V YES 180MA	TAE SUNG	TRANS
4	6170JB2017C	TRANSF□RMER,L□W V□LTAGE	115V 15V YES 180MA	TAE SUNG	TRANS
5	6170JB2017D	TRANSF□RMER,L□W V□LTAGE	140V 15V YES 180MA	TAE SUNG	TRANS
6	6630VM01213	C□NNECT□R (CIRC),WAFER	YW396 YE□NH□ 13P 3.96MM -13AV (13P-2,4,6,8,10,12)	YE□N H□	C□N1
7	6631JB2005A	C□NNECT□R ASSEMBLY	BP3,4,5,6,7,8-PJT PWB J□INT	SL ELEC.	C□N2
9	0IZZJB2016L	IC,DRAWING	TMP87C409N 28PIN SDIP BK GR-S552,592 BP-PJT [MASK]	T□SHIBA	IC1(0IZZJB2016M)
10	0IZZJB2016N	IC,DRAWING	TMP87C409N 28PIN SDIP BK R-B42,46 BP-PJT [MASK]	T□SHIBA	IC1(0IZZJB2016P)
11	0IKE781200B	IC,KEC	KIA7812PI 12V 1A,KEC - - - -	KEC	IC2
12	0IKE780500A	IC,KEC	KIA78S05P,3PIN,DIP. KEC	KEC	IC3
13	0IKE650030C	IC,KEC	KID65003AF 16S□P BK 7CH DRIVER	KEC	IC5
14	0IKE704200A	IC,KEC	KIA7042P 3P BK RESET	KEC	IC4
17	6920JB2005A	RELAY	JW1AFHN MATSUSHITA 12V 10A 15.6V 1A	NAIS	RY1
18	6920JB2003A	RELAY	G5N-1A □MR□N(JAPAN) 12V 16.7MA - -	□MR□N	RY2~4
19	6920JB2003A	RELAY	G5N-1A □MR□N(JAPAN) 12V 16.7MA - -	□MR□N	RY5
21	6212W5M002A	RES□NAT□R,CERAMIC	CSTS0400 MURATA 4MHZ +/- 0.5% 15PF TP N□NE	MURATA	□SC1
22	6102JB8001A	VARIST□R	SVC621D-14A SAMWHA UL/VDE BK 620V	SAM HWA	VA1
23	6102W5V006A	VARIST□R	SVC271D-14A SAMWHA UL/CSA/VDE TP	SAM HWA	VA1
24	0DD400709AA	DI□DE,RECTIFIERS	1N4007 TP M□T□R□LA - - 1A - - -	DELTA	D1~5
25	0DD414809AD	DI□DE	1N4148 PN□NEC TP52 D□N□NE35 100V 500MA 500MA 4NS 5?	R□HM	D6,D7
26	0CE108BJ610	CAPACIT□R,FIXED ELECTR□LYTIC	1000UF KME TYPE 35V 20% FL BULK	SAM HWA	CE1 (105°C RG/RD TYPE)
27	0CE227BH638	CAPACIT□R,FIXED ELECTR□LYTIC	220UF KME TYPE 25V 20% FM5 TP 5	SAM HWA	CE2 (105°C RG/RD TYPE)
28	0CE227BF638	CAPACIT□R,FIXED ELECTR□LYTIC	220UF KME TYPE 16V 20% FM5 TP 5	SAM HWA	CE3 (105°C RG/RD TYPE)
31	0CK102□K96A	CAPACIT□R,FIXED CERAMIC	1NF 2012 50V 80%,-20% R/TP X7R	SAM HWA	CC6
32	0CK223□K96A	CAPACIT□R,FIXED CERAMIC	22NF 2012 50V 80%,-20% R/TP X7R	SAM HWA	CC7~9
33	0CK104□K94A	CAPACIT□R,FIXED CERAMIC	100NF 2012 50V 80%,-20% R/TP F(Y5V)	SAM HWA	CC1~5,10~15
36	0RD3900G609	RESIST□R,FIXED CARB□N FILM	390 □HM 1/4 W 5.00% TA52	SMART	R3,4
37	0RJ2001E672	RESIST□R,METAL GLAZED(CHIP)	2K □HM 1/8 W 5% 2012 R/TP	R□HM	R9
38	0RD2001F609	RESIST□R,FIXED CARB□N FILM	2K □HM 1/6 W 5.00% TA52	SMART	R6~8
39	0RJ4701E672	RESIST□R,METAL GLAZED(CHIP)	4.7K □HM 1/8 W 5% 2012 R/TP	R□HM	R1,11~16
40	0RJ1002E672	RESIST□R,METAL GLAZED(CHIP)	10K □HM 1/8 W 5% 2012 R/TP	R□HM	R10,R5
41	0RD1002F609	RESIST□R,FIXED CARB□N FILM	10K □HM 1/6 W 5.00% TA52	SMART	R5
42	0RJ1004E672	RESIST□R,METAL GLAZED(CHIP)	1M □HM 1/8 W 5% 2012 R/TP	R□HM	R2
43	0RJ2612E472	RESIST□R,METAL GLAZED(CHIP)	26.1K □HM 1/8 W 1% 2012 R/TP	R□HM	RR1,RD1
44	0RD1001G609	RESIST□R,FIXED CARB□N FILM	1K □HM 1/4 W 5.00% TA52	SMART	R17
45	0RD1002F609	RESIST□R,FIXED CARB□N FILM	10K □HM 1/6 W 5.00% TA52	SMART	RCR1
48	0TR106009AC	TRANSIST□R,BIP□LARS	KRA106M(KRA2206) TP KEC	KEC	Q1~3
50	6854B50001A	JUMP WIRE	0.6MM 52MM TP TAPING SN	-	□P1(8MM)
51	6854B50001A	JUMP WIRE	0.6MM 52MM TP TAPING SN	-	TEST(8MM)
52	6854B50001A	JUMP WIRE	0.6MM 52MM TP TAPING SN	-	J02~04(8MM)
54	4920JB3007A	HEAT SINK	23.3*17*25 DRIVE IC STR R-S64,65,73 2PIN 1-SCREW 3MM	-	(IC2)
55	1SBF0302418	SCREW TAP TITE(S),BINDING HE	+ D3.0 L8.0 MSWR3/FZY	-	-
56	9VWF0120000	S□LDER(R□SIN WIRE) RS0	D1.20	HEE SUNG	-
57	49111004	S□LDER,S□LDERING	H63A	-	-
58	59333105	FLUX	SG;0.825-0.830 K□REA F.H-206	K□KI	-

7-5-3 PWB ASS'Y, DISPLAY AND PARTS LIST

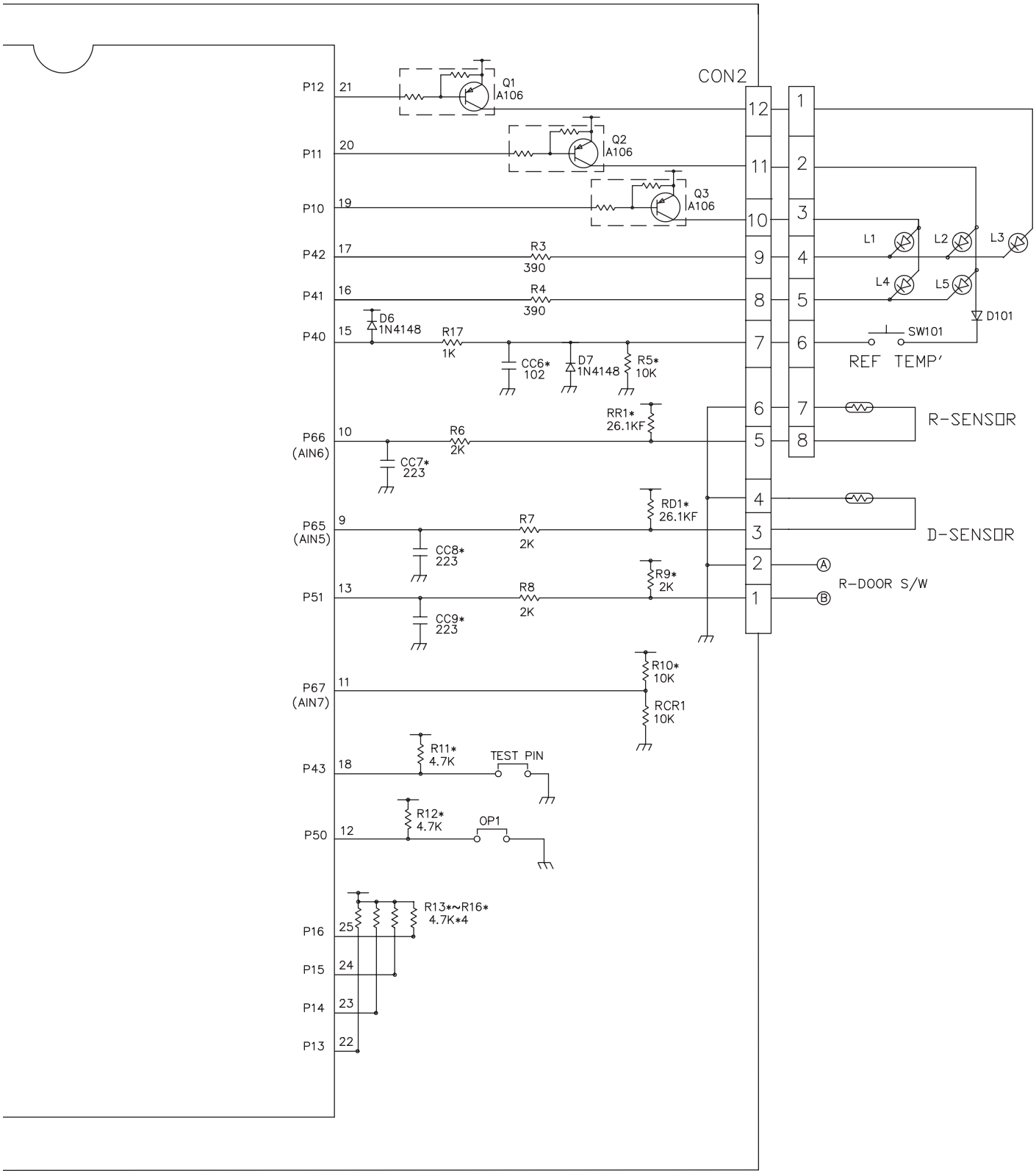


No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	6870JB8039B	PWB(PCB),DISPLAY	BP1,2,3,4-PJT I-MICOM DISPLAY	DOO SAN	-
-	-	-	-	-	-
-	-	-	-	-	-
2	6631JB2008A	CONNECTOR ASSEMBLY	BP1,2-PJT DISPLAY,JOINT	SL ELEC.	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
3	6600RRT002K	SWITCH,TACT	JTP1230A JEIL 12V DC 50MA	JEIL	SW101
-	-	-	-	-	-
4	0DLLE0019AA	LED	LEDTECH ELECTRONICS LT1824-81-BCM TP GREEN 2	LEDTECH	L1~L5
5	0DD414809AA	DIODE,SWITCHING	1N4148 26MM	ROHM	D101
-		-	-	-	-
6	-	-	-	-	-
7	6854B50001A	JUMP WIRE	0.6MM 52MM TP TAPING SN	-	J101
-	-	-	-	-	-
8	9VWF0120000	SOLDER(ROSIN WIRE) RS0	D1.20	HEE SUNG	-
9	49111004	SOLDER,SOLDERING	H63A	-	-
10	59333105	FLUX	SG;0.825-0.830 KOREA F.H-206	KOKI	-

7-6 PWB DIAGRAM



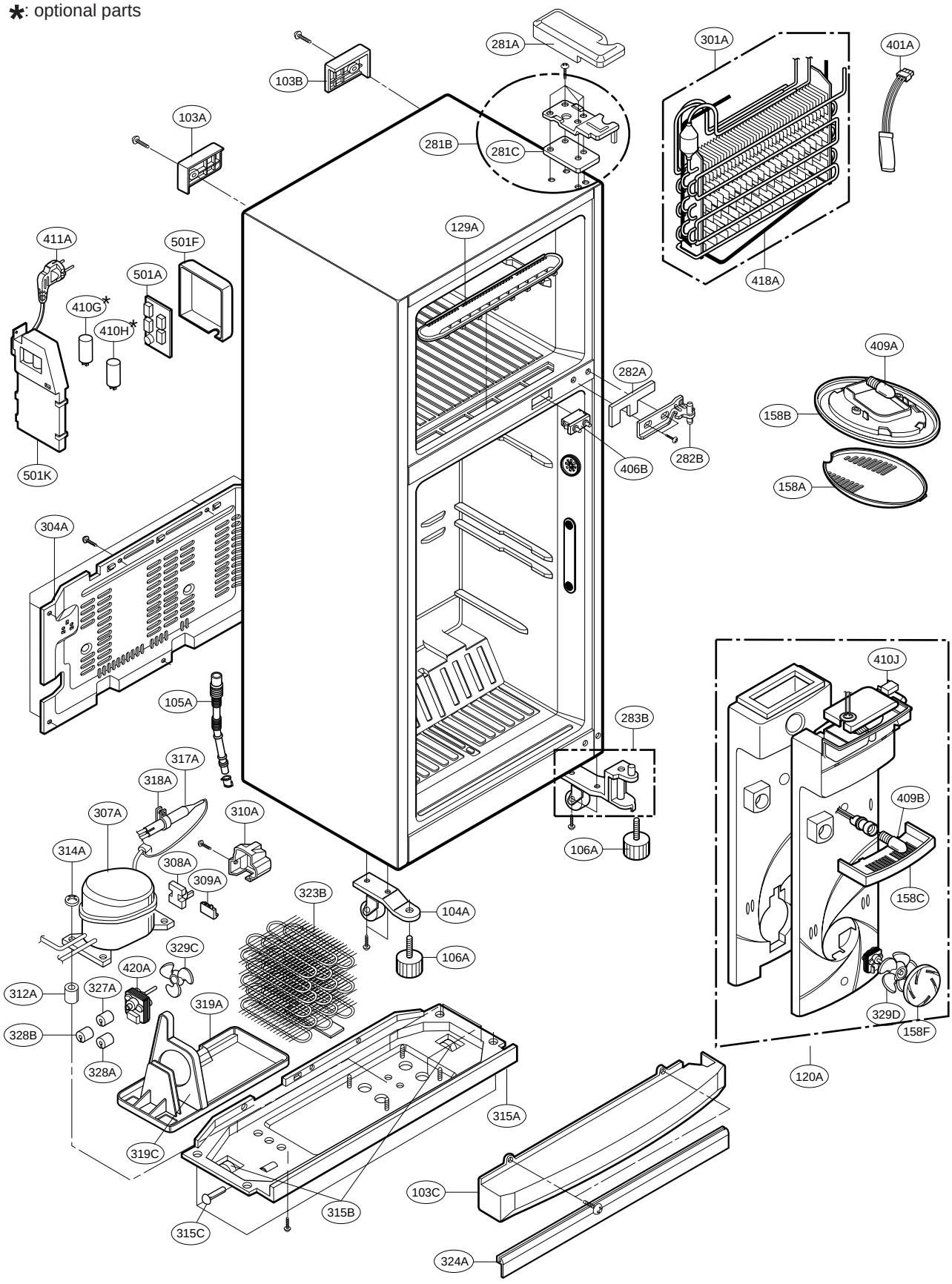
CIRCUIT DIAGRAM


CON2
P12
21
Q1
A106
P11
20
Q2
A106
P10
19
Q3
A106
P42
17
R3
390
P41
16
R4
390
P40
15
D6
1N4148
R17
1K
CC6*
102
D7
1N4148
R5*
10K
RR1*
26.1KF
P66
(AIN6)
10
R6
2K
CC7*
223
RD1*
26.1KF
P65
(AIN5)
9
R7
2K
CC8*
223
R9*
2K
P51
13
R8
2K
CC9*
223
R10*
10K
P67
(AIN7)
11
RCR1
10K
R11*
4.7K
TEST PIN
P43
18
R12*
4.7K
OP1
P50
12
R13*~R16*
4.7K*4
P16
25
P15
24
P14
23
P13
22
L1
L2
L3
L4
L5
D101
SW101
REF TEMP'
R-SENSOR
D-SENSOR
R-DOOR S/W
Ⓐ
Ⓑ

8. EXPLODED VIEW

▼ The parts of refrigerator and the shape of each part are subject to change in different localities.

✱: optional parts



✱: optional parts